ENGG*4400 Biomechanical Engineering Design
Fall 2013

School of Engineering

(Draft Revision 1b: August 26, 2013)

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1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: John Runciman, Ph.D., P.Eng.
Office: THRN 1344, ext. 53072
Email: jruncima@uoguelph.ca
Office hours: By appointment

1.2 Lab Technician

Technicians: Carly Fennel
Office: THRN 1102, ext. 56676
Email: gennc@uoguelph.ca

1.3 Teaching Assistants

GTA	Email	Office Hours
Gerry Drouillard	gdrouill@uoguelph.ca	Please use lab hours and by appointment

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2 LEARNING RESOURCES

2.1 Course Website

Material relevant to the course including news, announcements, and grades will be regularly posted to the ENGG*4400 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources: Not Applicable

2.3 Recommended Resources: Not Applicable

2.4 Other Resources

Lecture Information: Lecture notes will not be posted on the web page.

Lab Information: The Teaching Assistant will be available in lab periods to direct activities and answer questions. The Teaching Assistant will provide resources regarding tutorials and links to related web pages.

2.5 Communication & Email Policy

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. It is your responsibility to check the course website regularly. As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its student.

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3 ASSESSMENT

3.1 Distribution and Dates

Assignments:

Concept Sketches	5%
3-D Modelling	5%
Client Management	5%
Resume	5%

Design Project:

Design Proposal Presentation (date TBD)	10%
Design Proposal Submission (date TBD)	10%
Design Report, (date TBD)	35%

Final Exam:

December 3, 08:30-10:30, Room TBA on Webadvisor	25%

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Passing grade: In order to pass the course, your overall average must be 50% or above and your Final Exam mark must be 50% or above. A mark of below 50% in the Final Exam will result in that mark being assigned for the entire course.

Late Submissions will not be accepted.

Grading Philosophy: The grading philosophy used for this course will recognize that design has a significant artistic component and is not a right or wrong situation. Thus, we will start with a perspective that your work is assumed to be a "B" until there is evidence within that work that is impressive or aspects that are disappointing. Impressive and disappointing components are integrated to leave a final assessment. Letter grades are used to reflect that the process is not ±2% accurate and that design could never be assessed with fine resolution.

Letter grade translation:

A+	Really Impressive	100
A	Impressive	90
A-		82
B+		78
B	Expected	75
B-		72
C+		68
C	Satisfactory	65
C-		62
D+		58
D	Disappointing, serious flaws	55
D-		52
F	Inadequate	35
X	no submission or wholly inadequate	0

The Design Project: This project forms a major activity in the course. Teams will be asked to evaluate individual team member participation. Evidence of lack of participation by individuals will result in a modified grade assessment for those students.

Final Exam: The Final Exam will be used to assess your understanding of the lecture material. The Final Exam will be closed book with no electronic aids permitted.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

This course covers concept development, design, modeling, manufacture and testing of biomechanical devices including athletic equipment, assistive devices, medical implants and tools. Other topics include the biomechanical factors influencing design, regulatory issues, current development trends, and the possible future direction of design and technology.

Prerequisite(s): ENGG*3150, ENGG*3170

Credit Weighting: 0.75

This means an average student requires about 15 hours per week to get a 'B' grade. This 15 hours includes the 3 hrs lecture, 2 hrs lab per week.

4.2 Course Aims

This course was designed to provide a real world engineering design experience for students approaching graduation. Content of the course has been developed to help students maximize the application of their technical and interpersonal skills, with the goal of helping to bridge their academic experience to post graduation design projects in industry and research. The design project in the course typically involves external individuals such as clinicians or other health care professionals. The class is involved in all stages of the design project including the development of project logistics, setting deliverables and establishing expectations.

4.3 Learning Objectives

Students who successfully complete this course will be able to:

1. Identify common biomechanical device problems,
2. specify suitable device materials, and manufacturing strategies
3. apply engineering principles to the development of novel biomechanical designs,
4. design and manage the development of biomedical devices.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Assessment

1. Knowledge Base for Engineering	Project
2. Problem Analysis	Assignments, Exam, Lab / Project
3. Investigation	Lab / Project
4. Design	Lab / Project
5. Use of Engineering Tools	Lab, Project
6. Communication	Labs / Project
7. Individual and Teamwork	Labs / Project
8. Professionalism	Lab / Project
9. Impact of Engineering on Society and the Environment	Lab / Project
10. Ethics and Equity	Assignments, Exam, Lab/Project
11. Environment, Society, Business, & Project Management	Lab / Project
12. Life-Long Learning	Lab / Project

4.5 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will present relevant material including case studies, discuss issues relevant to design and provide information and guidance on issues of communication, teamwork and design. Scheduled classes will be the principal venue to provide information and feedback for the course. Feedback for Seminar presentations and lab work will be through those venues.

4.6 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and labs. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor and Teaching Assistants. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

4.7 Relationships with other Courses & Labs

Previous Courses:

ENGG*3150, ENGG*3170: Basics of biomechanics and biomaterials, necessary for effective biomechanical design.

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

LECTURES: MACK 117 T & TH 2:30 – 3:50

LABS: There will be certain lab periods where guests and material will be made available for the design project. This material and the guests may only be available on a limited basis. It is the responsibility of the students to ensure they are present during these times.

All of the following rooms THRN 1006, THRN 1313 and THRN 2135 will be used for the lab component of this course. Lab times are as follows:

0101	Monday	1:30 – 3:20
0103	Wednesday	3:30 – 5:20
0104	Thursday	9:30 – 11:20

EXAM: Location: TBD Dec. 3, 2013 8:30 – 10:30

5.2 Lecture Schedule (Subject to change at the discretion of the instructor)

Lectures	Lecture Topics	Learning Objectives
1	Introduction to Biomechanical Design and Course Administration	1
2	Engineering Drawings, Dimensioning, Tolerancing and Case Studies	4
3	Design Process	4
4	Project Introduction	1
5	Project Discussion and Logistics Development	1, 2 & 3
6-9	Physical Data Sources, Types and Characteristics	4
10-11	Functional Requirements including Life Expectancy	4
12	Case Studies	1, 2, 3 & 4
13 - 15	Materials	2
16 - 18	Manufacturing	2
19	Case Studies	2
20	Guest Lecture, Resume Writing	4
21 - 23	Guest lectures, TBA	1 - 4
24	Review	

5.3 Lab Schedule

Week	Lab Activity	Learning Objectives
1 & 2	Introduction to Biomechanics Lab Instrumentation	4
3	Project Discussion	4
4	Exploration of Equipment and Computer Software capabilities	4
5	Project Development	1, 2, 3 & 4
6-10	Project, Coaching, Data Collection and Testing	1, 2, 3 & 4
11-12	Project Presentations	1, 2, 3 & 4

5.4 Other Important Dates:

Thursday, 5 September 2013: First class

Monday, 14 October 2013: Thanks giving holiday

Thursday, 31 October 2013: drop date – 40th class

Thursday, 28 November 2013: last class (Monday Schedule in effect)

Please see your program guide for further specifics.

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of

what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

Academic Conduct Expectations and Academic Misconduct: The course requires several team written submissions. All team members must sign the cover sheet for the submissions. This cover sheet must also have the following statement.

In signing this cover page, I certify that I have been an active member of the team and provided approximately equal contribution to the work. I understand that taking credit for work that is not my own is a form of academic misconduct and will be treated as such.

Respect for ownership of Intellectual Property (e.g. copyright, patents, trade marks, music, software) is important. Work that has been created or prepared with unlicensed or illegal software will not be knowingly accepted for submission within the course (e.g. a grade of zero will be assigned).

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or

accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.csd.uoguelph.ca/csd/